Minimally invasive tricuspid valve surgery in high risk patients

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33rd EACTS Annual Meeting
Lisbon, Portugal, 3-5 October 2019
Exploring New Frontiers of Science

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Background / Study Objective

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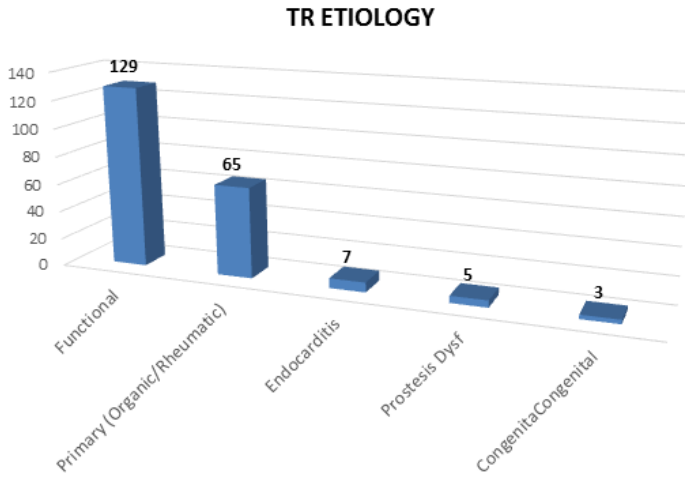
- Minimally invasive surgery has been an increasingly success in recent years and excellent results have been published in correlation with mitral valve surgery
- In literature there is not a large series of study about minimally invasive tricuspid valve surgery and the outcomes after this approach have not been well described. Even the latest ESC/AHA guidelines have not been expressed about the use of minimally invasive techniques
- In the era of increasing adoption of catheter-based treatments, this study analyzed our 12-year experience with minimally invasive TV operations.

Patients

From November **2005** to June **2018**, Minimally Invasive TV surgery was performed in **209** patients

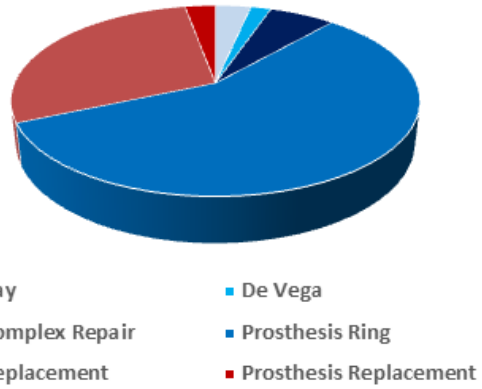
PREOPERATIVE CHARACTERISTICS	(n=209)
Age, mean±SD (median)	64.9 ± 13.2 (67)
Male sex, n (%)	64 (30.6%)
BMI, mean±SD (median)	24.5 ± 4.4 (23.8)
EuroAdd, mean±SD (median)	7.3 ± 2.8 (7.0)
EuroLog, mean±SD (median)	10.2 ± 9.0 (7.2)
Urgency, n (%)	3 (1.4%)
Hypertension, n (%)	136 (65.1%)
Renal failure, n (%)	38 (18.2%)
Crea PRE, mean±SD (median)	1.21 ± 0.78 (1.0)
COPD, n (%)	17 (8.1%)
Diabets, n (%)	34 (16.3%)
Peripheral Vasculopathy, n (%)	10 (4.8%)
Atrial fibrillation, n (%)	152 (72.7%)
Pre-op Neuro deficit, n (%)	12 (5.7%)
NYHA III-IV, n (%)	142 (67.9%)
Redo, n (%)	101 (48.3%)
Previous TV procedures, n (%)	24 (11.5%)
TR grade, mean±SD (median)	3.5 ± 0.8 (4.0)
TV annulus mm, mean±SD (median)	45.8 ± 7.2 (43.0) [89]
TR functional, n (%)	129 (61.7%)
TR primary, n (%)	65 (31.1%)
TV Endocarditis, n (%)	7 (3.5%)
TV Prosthesis Dysfunction, (%)	5 (2.4%)
TR Congenital, n (%)	3 (1.4%)
MV disease, n (%)	139 (66.5%)
MV stenosis, n (%)	37 (17.7%)
MV regurgitation, n (%)	111 (53.1%)
EF, mean±SD (median)	58.2 ± 9.8 (60.0)
Pulmonary Hypertension (>60 mmHg), n(%)	53 (25.4%)
PAPs, mean±SD (median)	52.5±14.4 (51) [159]



REDO CHARACTERISTICS	(n=101/209) 48.3%
1st Redo, n (%)	59/101 (58.4%)
2nd Redo, n (%)	22/101 (21.8%)
3rd or more Redo, n (%)	20/101 (19.8%)
Previous TV Procedures, n (%)	24/101 (23.8%)
TV Replacement, n (%)	5/24 (20.8%)
TV Repair, n (%)	19/24 (79.2%)
Kay procedures, n (%)	4/24 (16.6%)
De Vega procedures, n (%)	14/24 (58.3%)
Prosthesis Ring, n (%)	1/24 (4.2%)

Methods

OPERATIVE DATA	(n=209)
TV repair	143 (68.4%)
De Vega annuloplasty, n (%)	4 (1.9%)
Kay annuloplasty, n (%)	7 (3.3%)
Annular ring, n (%)	119 (56.9%)
Complex TV repair, n (%)	13 (6.2%)
Leaflet Augmentation, n (%)	4 (1.9%)
TV replacement, n (%)	60 (28.7%)
Tricuspid prosthesis replacement, n (%)	6 (2.9%)
Isolated TV procedure, n (%)	61 (29.2%)
Combined procedures	
MV repair, n (%)	47 (22.5%)
MV replacement, n (%)	64 (30.6%)
Mitral prosthesis replacement, n (%)	28 (13.4%)
ASD closure, n (%)	21 (10.0%)
Myxoma resection, n (%)	2 (0.9%)
AF cryoablation, n (%)	17 (8.1%)
TV procedures on beating heart, n (%)	97 (46.4%)
Clamping,	
Endoreturn, n (%)	112 (53.6%)
Transthoracic, n (%)	56 (26.8%)
Endodirect, n (%)	2 (0.9%)
Fibrillatory arrest, n (%)	12 (5.7%)
Femoral cannulation, n (%)	202 (96.7%)
Axillary cannulation, n (%)	4 (1.9%)
External Caval snaring (tourniques), n (%)	178 (85.2%)
Endovascular ballons Caval occlusion, n (%)	31 (14.8%)
CPB, mean±SD (median)	146.5 ± 49.5 (140.0)
X-Clamp, mean±SD (median)	90.1 ± 36.6 (90.0)
Conversion to sternotomy, n (%)	6 (2.8%)
Death OR, n (%)	0 (0%)



ISOLATED TRICUSPID DATA	(n=61/209)29.2%
EuroAdd, mean±SD (median)	7.0 ± 2.3 (7.0)
EuroLog, mean±SD (median)	7.7 ± 5.9 (6.0)
Redo, n (%)	42 (68.95)
Previous TV procedures, n (%)	10 (16.4%)
TV repair	22 (36.1%)
De Vega annuloplasty, n (%)	0 (0%)
Kay annuloplasty, n (%)	0 (0%)
Annular ring, n (%)	12 (19.7%)
Complex TV repair, n (%)	10 (16.4%)
TV replacement, n (%)	33 (54.1%)
Tricuspid prosthesis replacement, n (%)	6 (9.8%)
TV procedures on beating heart, n (%)	42 (68.9%)
CPB, mean±SD (median)	102.0 ± 26.9 (100.0)
X-Clamp, mean±SD (median)	48.3 ± 31.6 (51.5)
Conversion to sternotomy, n (%)	3 (4.9%)

Results 1

- Mean Cardiopulmonary bypass (CPB) time was 146.5 ± 49.5, the mean cross clamp was 90.1 ± 36.6. In patients with isolated tricuspid CPB time was 102.0 ± 26.9, while the mean cross clamp was 48.3 ± 31.6.
- Conversion to sternotomy was necessary in 6 patients (2.8%), in half of the cases it occurred, at the beginning, as a result of tenacious adhesions.
- Reoperation for bleeding was necessary in 19 (9.1%) cases, of which 15 were redo, and blood transfusion in 100 (47.8%) patients.
- Stroke complication occurred only in 2 (0.9%) patients, PMr implantation in 15 (7.2%), hemodialysis for acute renal failure in 10 (4.8%), new onset of atrial fibrillation in 16 (28.1%) and groin wound infection or lymphocele in 5 (2.4%).
- Mean Intensive care unit stay was 3.6 ± 11.3 days (median 1.0 day). Mean Ventilation time was 40.5 ± 245.2 hours (median 12.0 h). Mean hospital stay was 11,9 ± 12,8 days (median 8.0 days).
- Overall hospital mortality was 3.8%. Intraoperative death occurred in 1 patient due to hemorrhagic shock. Other causes of death were multi-organ failure in 5 patients and sepsis in 2. 30- day mortality after TV repair was 2.1% (3/143) compared to 7.6 % (5/66) after TV replacement while after TV isolated procedure was 1.6% (1/61) compared to TV associated procedures 4.7% (7/148).
- At the early postoperative TEE evaluation trivial or no regurgitation was identified.
- Freedom from early re-operation for TV disease was 100%.

Results 2

POST-OPERATIVE CHARACTERISTICS	(n=209)
Ventilation, mean±SD (median)	40.5 ± 245.2 (12.0)
Prolonged VAM, n (%)	14 (6.7%)
Re-intubation, n (%)	22 (10.5%)
ICU stay, mean±SD (median)	3.6 ± 11.3 (1.0)
Tracheostomy, n (%)	5 (2.4%)
Unit GRC transfused, mean±SD	2.5 ± 4.4 (2.0)
Unit PFC transfused, mean±SD	0.8 ± 2.0 (0.0)
Unit PLT transfused, mean±SD	0.2 ± 0.6 (0.0)
Patients transfused, n (%)	100 (47.8%)
Re exploration for bleeding, n (%)	19 (9.1%)
Re exploration *pooled*, n (%)	4 (1.9%)
TV Re-operation, n (%)	0 (0%)
Thoracentesis, n (%)	7 (3.3%)
Neurologic events, n (%)	10 (4.8%)
Minor, n (%)	8 (3.8%)
Major, n (%)	2 (0.9%)
Groin wound infection/linfocele, n (%)	5 (2.4%)
Hemodialysis, n (%)	10 (4.8%)
Crea POST, mean±SD (median)	1.1 ± 1.0 (0.78)
New onset AF, n (%)	16/57 (28.1%)
PM implantation, n (%)	15 (7.2%
Hosp stay, mean±SD (median)	11.9 ± 12.8 (8.0)
30-day mortality, n (%)	8 (3.8%)

DEATH CHARACTERISTICS	(n=8/209) 3.8%
Cause of death	
Heart Failure,n (%)	4/8 (50%)
Sepsis, n (%)	2/8 (25%)
Massive Bleeding, n (%)	1/8 (12.5%)
Major Neurologic event, n (%)	1/8 (12.5%)
30- day Mortality after	
TV repair, n (%)	3/143 (**2.1**%)
TV replacement, n (%)	5/66 (7.6%)
TV associated procedures, n (%)	7/ 148(4.7%)
TV isolated procedures, n (%)	1/61 (**1.6**%)

Conclusion

- Minimally invasive Tricuspid surgery is safe, feasible and reproducibile, even for hight- risk population.
- It ensure low perioperative morbidity and mortality. It has an added value in case of reoperative procedures
- In our centre it represents the gold standard and the standard technique of TV surgery.
- Minimally invasive TV Surgery should be considered the benchmark for new hybrid catheter-based technologies